

(43) Date of A Publication 04.11.1998

(21) Application No 9804622.0  
(22) Date of Filing 05.03.1998  
(30) Priority Data  
(31) 97013419 (32) 11.04.1997 (33) KR

(51) INT CL<sup>6</sup>  
G06F 9/445  
(52) UK CL (Edition P )  
G4A AFL  
(56) Documents Cited  
EP 0628908 A1 US 5590373 A  
(58) Field of Search  
UK CL (Edition P ) G4A AFL  
INT CL<sup>6</sup> G06F 9/445  
Online:WPI, INSPEC

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(54) Abstract Title  
Reprogramming portable information terminal

(57) A method of replacing a program in a portable information terminal equipment including a communication unit 250 for transmitting and receiving data to and from an external device, a memory unit 230 for temporarily storing a new program and a utility program operating to carry out the replacement of the new program, which are received from the communication unit, and a program storage unit 220 for replacing a prestored program with the new program and storing the replaced new program comprises the steps of:-receiving (410, Figure 4) the new and utility programs via the communication unit, storing the new and utility programs in the memory unit and replacing (420) the prestored program in the program storage unit with the new program, using the utility program. As described above, the program of a portable information terminal is replaced using a communication unit instead of an external PCMCIA card, so that reprogramming is achieved at low cost.

FIG. 2

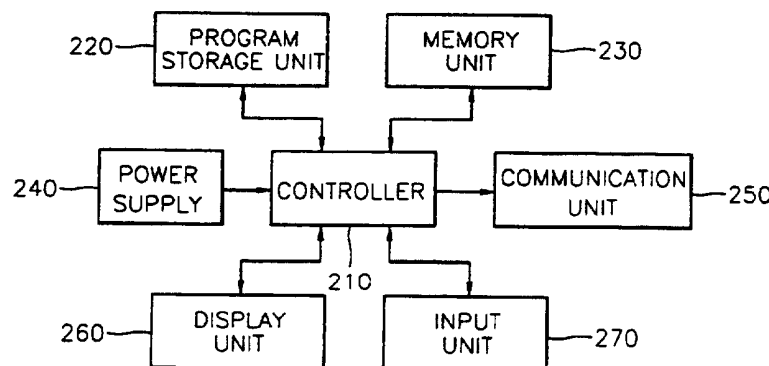


FIG. 1<sup>1/4</sup> (PRIOR ART)

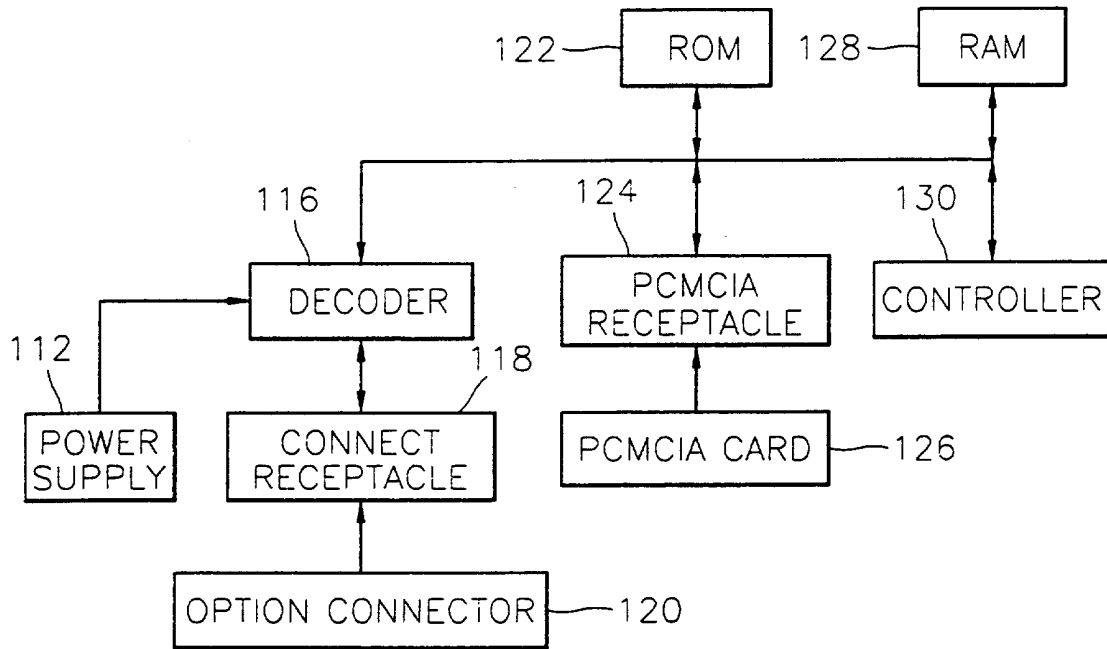
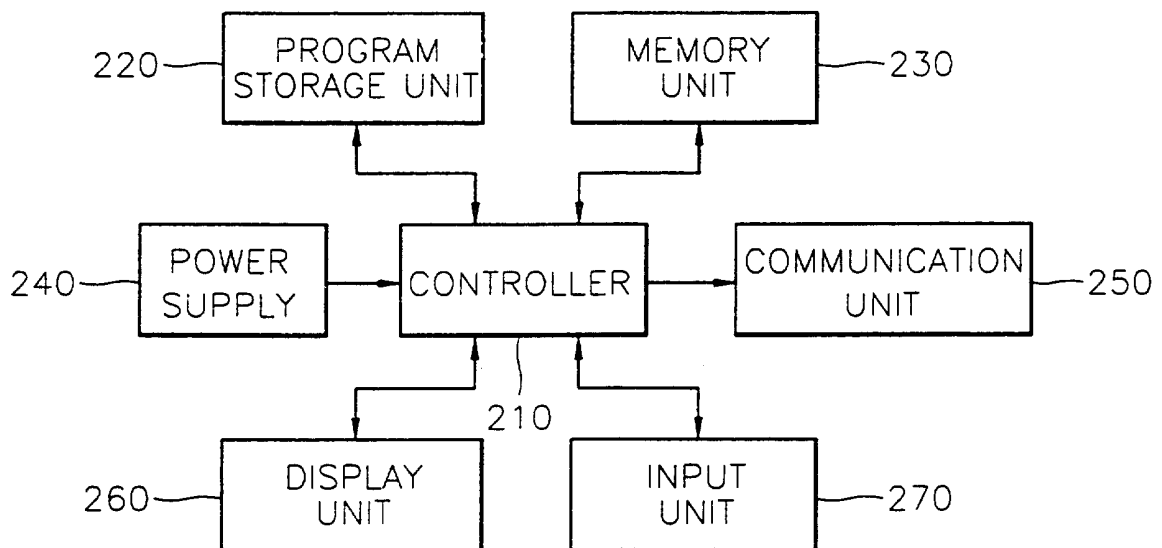


FIG. 2



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FIG. 3

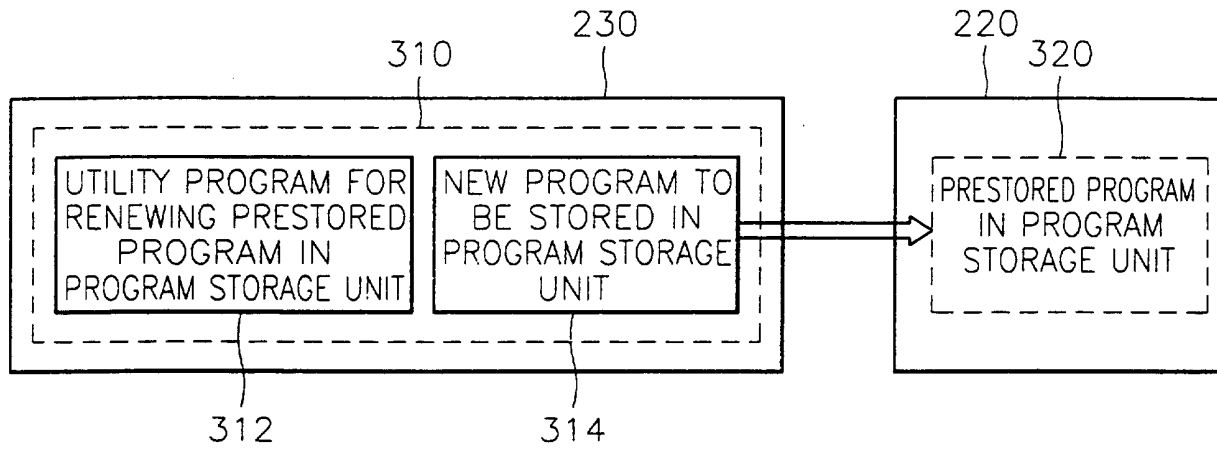
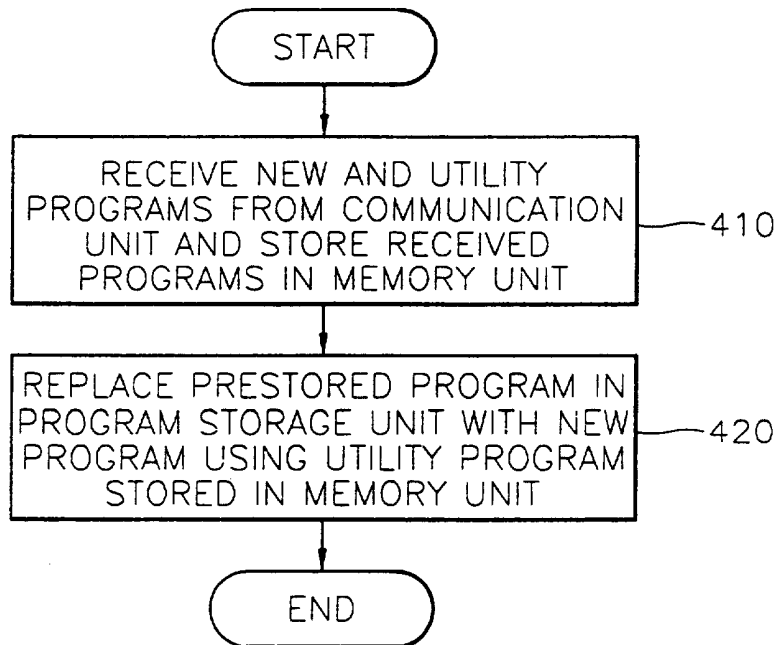
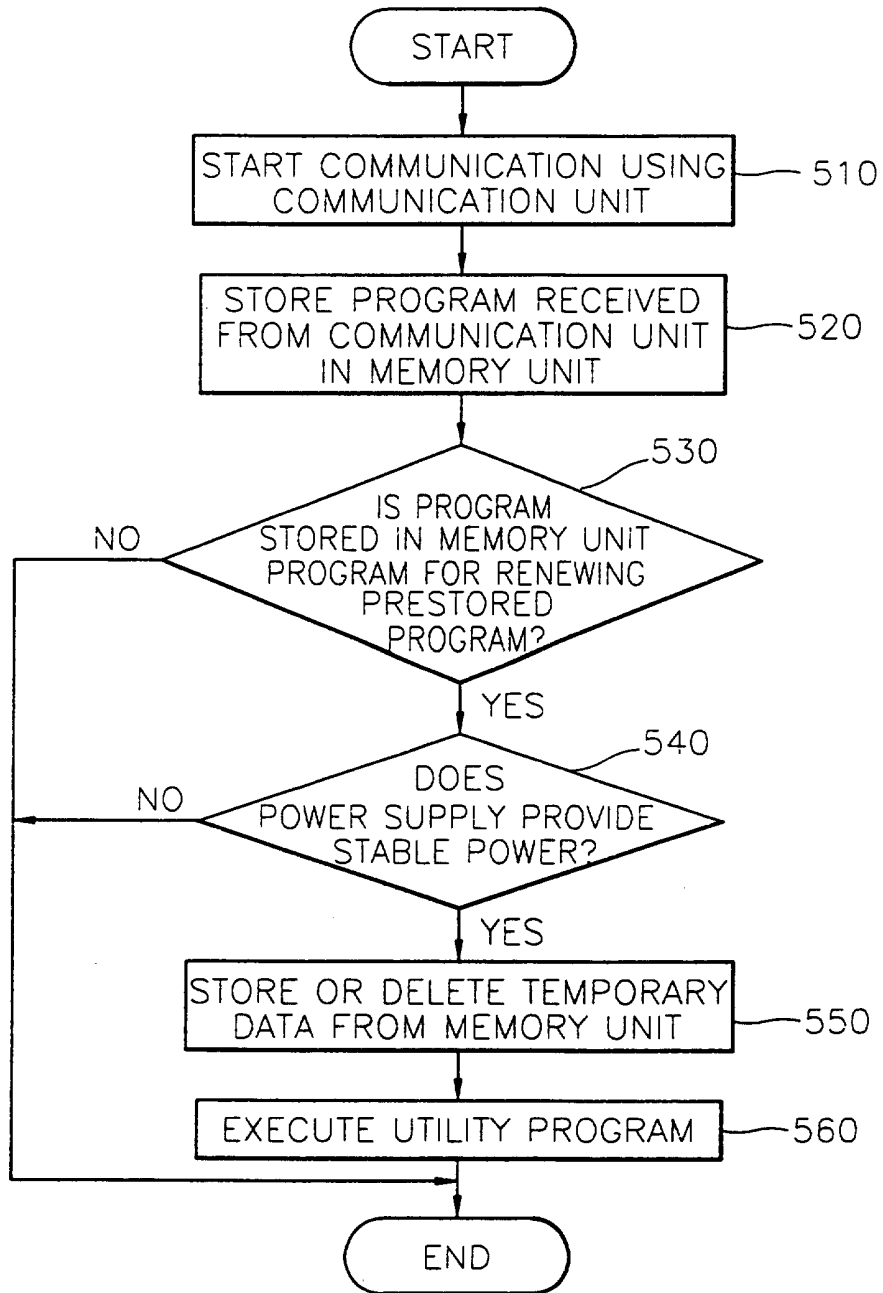


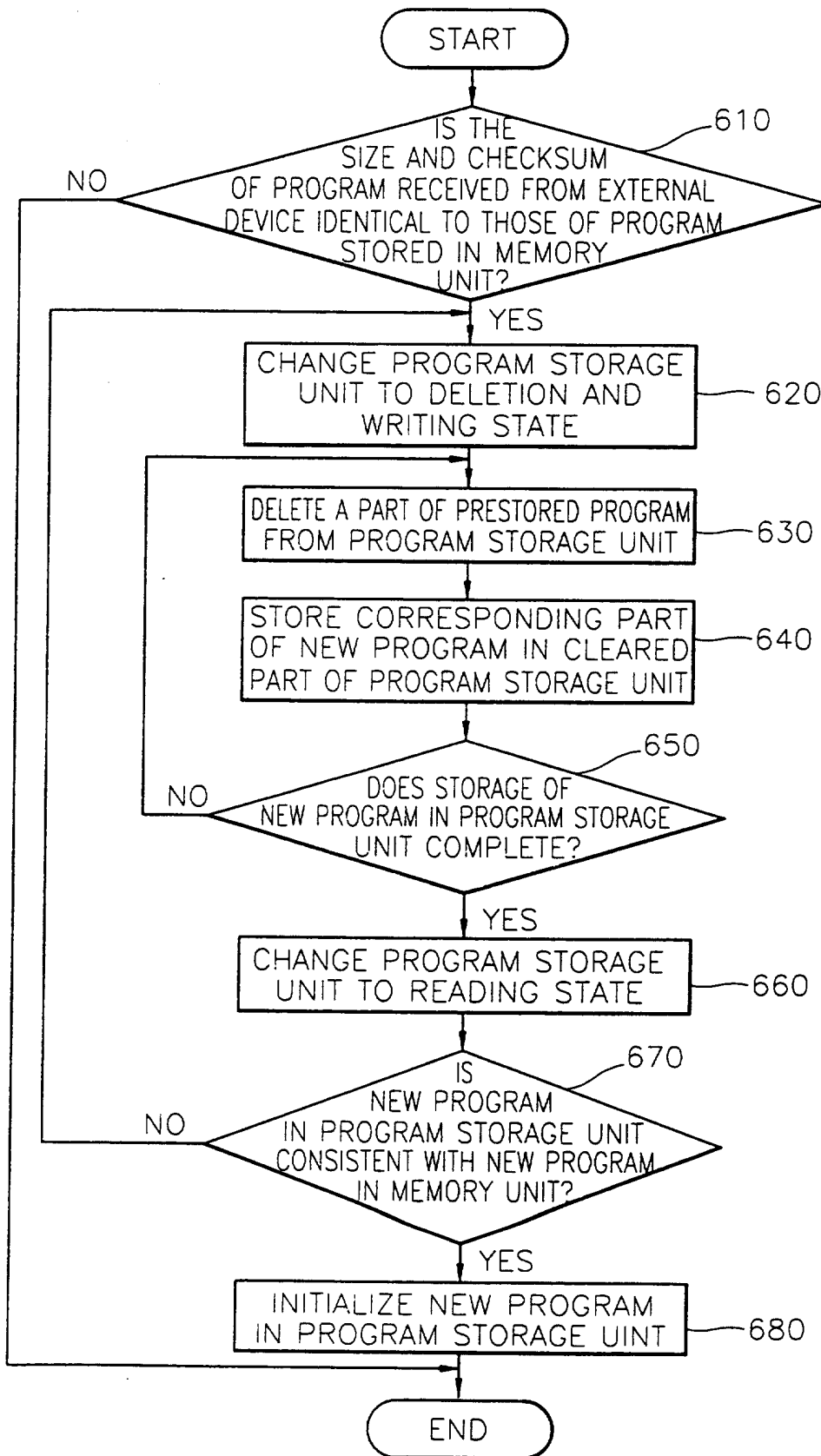
FIG. 4



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FIG. 5



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FIG. 6



METHOD FOR REPROGRAMMING A PORTABLE INFORMATION TERMINAL

The present invention relates to a method for replacing a program in portable information terminal equipment, and more particularly, to a method for replacing a program stored in a program storage unit of a portable information terminal using a communication unit.

In general, a portable information terminal is a multi-media product having many functions, e.g., a cellular phone, a wireless facsimile, a wireless pager, or an electronic pocketbook, that can search for information at any time and any place while being carried in a user's hand and transmit and receive data by being connected to external devices such as a computer.

The portable information terminal cannot provide as many functions as a computer, since it must be manufactured to be as small as possible, and can run only a small program because of its small memory capacity. That is, it is general to include a small-capacity ROM (ROM: read only memory or EPROM: programmable ROM) and a random access memory (RAM) or a personal computer memory card industry association (PCMCIA) card. Here, the ROM is low-priced, but a program recorded therein cannot be changed. A program in a RAM can be easily be changed, but the RAM is expensive, and is prone to be damaged by events such as power failure. The PCMCIA card is expensive. It is desired that the portable information terminal is able to add a new program as needed or replace a prestored program with a new program.

Figure 1 shows the entire configuration of a conventional portable information terminal which is disclosed in U.S. Patent No. 5,590,373.

As shown in Figure 1, a new program to replace a prestored program in a ROM 122 is recorded in a PCMCIA card 126. Also, a utility program operates to replace the prestored program recorded in the ROM 122 with the new program. The utility program is performed by being transferred through a PCMCIA receptacle 124 to a RAM 128 together with the new program. A particular bit combination in an option connector 120 informs a controller 130 that the PCMCIA card 126 having the new program recorded therein is being inserted into the terminal's main body. At this time, the controller 130 transfers the utility program in the PCMCIA card 126 to the RAM 128 and then performs the transferred utility program. Here, the utility program operates to replace the prestored program in the ROM 122 with the new program in the PCMCIA card 126. A decoder 116 interprets an option of the option connector 120. A power supply 112 supplies current to the static current generating device of the option connector 120 through a connector receptacle 118. A program replacement method in the conventional portable information terminal cannot be applied to equipment which doesn't include the PCMCIA card 126. Also, special units such as the option connector 120 and a connector receptacle 118 are required in order to replace the program in the ROM 122.

It is an aim of at least preferred embodiments of the present invention to address the problems discussed above and provide an improved method for replacing a program stored in a program storage unit.

According to one aspect of the present invention, there is provided a method of replacing a program in portable information terminal equipment including a communication unit for transmitting and receiving data to

and from an external device, a memory unit for temporarily storing a new program and a utility program operating to carry out the replacement of the new program, which are received from the communication unit, and a program storage unit for replacing a prestored program with the new program and storing the replaced new program, the method comprising the steps of: (a) receiving the new and utility programs via the communication unit, and storing the new and utility programs in the memory unit; and (b) replacing the prestored program in the program storage unit with the new program, using the utility program.

The step (a) preferably comprises the substeps of: (a1) storing in the memory unit the new and utility programs received via the communication unit from the external device; and (a2) checking the size and checksum of the new and utility programs stored in the memory unit to determine whether the new and utility programs were normally transmitted.

The step (b) preferably comprises the substeps of: (b1) changing the program storage unit into a deletion and writing state when the new program was normally stored in the memory unit; (b2) deleting the prestored program in the program storage unit; (b3) storing the new program in the program storage unit; (b4) changing the program storage unit into a reading state when the storage of the new program in the program storage unit is completed; and (b5) initializing the new program stored in the program storage unit if the new program was normally stored in the program storage unit.

For a better understanding of the invention, and to show how embodiments of the same may be carried into



effect, reference will now be made, by way of example, to the accompanying diagrammatic drawings, in which:

5 Figure 1 is a block diagram of the entire configuration of a conventional portable information terminal;

10 Figure 2 is a block diagram of the configuration of a typical portable information terminal to which the present invention can be applied;

Figure 3 is a detailed view of a program storage unit and a memory unit shown in Figure 2;

15 Figure 4 is a flowchart illustrating a method for replacing a program in portable information terminal equipment, according to the present invention;

20 Figure 5 is a detailed flowchart of a first step shown in Figure 4; and

Figure 6 is a detailed flowchart of a second step shown in Figure 4.

25 Referring to Figure 2, a typical portable information terminal, to which the present invention may be applied, includes a controller 210, a program storage unit 220, a memory unit 230, a power supply 240, a communication unit 250, a display unit 260 and an input  
30 unit 270.

The controller 210 executes a program stored in the program storage unit 220 or the memory unit 230 if power is applied by the power supply 240 and a key signal is  
35 applied by the input unit 270, and controls to display the

results of execution of the program on the display unit 260.

5 The program storage unit 220 stores a program that the controller 210 can perform. The program storage unit 220 stores data when a voltage lower than or equal to a predetermined level is supplied or no power is supplied, and can erase stored data or store new data when a voltage that is greater than or equal to the predetermined level  
10 is supplied, as can an EPROM or flash memory. The program storage unit 220 stores basic programs and data which are required to operate a system, and which are not changed under typical conditions.

15 The memory unit 230 stores a program which can be executed by the controller 210 and data which is used by the program, and is capable of being read and written to, like a RAM. The program stored in the memory unit 230 is executed with the assistance of the program stored in the  
20 program storage unit 220, and can be deleted or changed.

The communication unit 250 allows the portable information terminal system and another external system to exchange data, and can use a telephone line, radio  
25 frequency or infra-red transmission, etc.

Figure 3 is a detailed view of the program storage unit 220 and the memory unit 230 shown in Figure 2. Reference numeral 310 denotes programs stored in the  
30 memory unit 230. The programs are a utility program 312 which operates to replace a program already stored in the program storage unit 220 and a new program 314 to be stored in the program storage unit 220. Also, reference numeral 320 denotes a program prestored in the program  
35 storage unit 220.

Figure 4 is a flowchart illustrating the preferred method for replacing a program in portable information terminal equipment. The method comprises a first step 410 of receiving the utility and new programs 312 and 314 from the communication unit 250 and a second step 420 of replacing the prestored program 320 in the program storage unit 220 with the new program 314, using the utility program 312.

Figure 5 is a detailed flowchart of the first step 410 shown in Figure 4. In step 510, a communication starts using the communication unit 250. In step 520, the utility and new programs 312 and 314 received from the communication unit 250 are stored in the memory unit 230. In step 530, it is determined whether the utility and new programs 312 and 314 stored in the memory unit 230 are programs for replacing the prestored program 320 in the program storage unit 220. Here, in order to accomplish the determination of step 530, the filenames of the utility and new programs 312 and 314 can be compared with prearranged reserved filenames, or a specification describing the content of a program can be checked. When it is determined in step 530 that the utility and new programs 312 and 314 stored in the memory unit 230 are programs for replacing the prestored program 320 in the program storage unit 220, it is determined whether the power supply supplies a stable voltage, in step 540. Here, it must be checked whether the power supply 240 can supply a sufficient voltage and current to replace the prestored program 320 in the program storage unit 220, before the utility program 312 is executed. In step 550, when power is supplied, data temporarily stored in the memory unit 230 is permanently stored or deleted. That is, temporary data of programs other than the utility and new programs 312 and 314 is stored elsewhere or deleted,

to secure enough space to perform the utility program 312  
in the memory unit 230. In step 560, the utility program  
312 is executed. Here, after the utility program 312 has  
been executed, the other programs stored in the program  
5 storage unit 220 are prevented from being executed.

Figure 6 is a detailed flowchart of the second step  
420 of Figure 4. A determination is made of whether the  
size and checksum of a program received from an external  
10 device are equal to the size and checksum of the programs  
which are stored in the memory unit 230, in step 610.  
That is, the size and the checksum are used to check  
whether the utility and new programs 312 and 314 have been  
normally transmitted from the external device and stored  
15 in the memory unit 230. When the compared values are  
identical to each other in step 610, the program storage  
unit 220 is changed to a deletion and writing state, in  
step 620. In step 630, a part of the prestored program  
320 in the program storage unit 220 is deleted. In step  
20 640, a part of the new program 314 is stored in the  
cleared part of the program storage unit 220. The steps  
630 and 640 are repeated until the new program 314  
completely replaces the program 320 originally prestored  
in the program storage unit 220. It is determined whether  
25 the new program 314 is completely stored in the program  
storage unit 220, in step 650. When the storage of the  
new program 314 is completed in step 650, the program  
storage unit 220 is changed to a reading state, in step  
660. In step 670, the contents of the new program in the  
30 program storage unit 220 is compared with that of the new  
program in the memory unit 230, to find out if they are  
identical or not. When it is determined in step 670 that  
the contents of the programs are consistent with each  
other, the new program in the program storage unit 220 is  
35 initialized, in step 680.

As described above, the program of a portable information terminal is replaced using a communication unit instead of an external card, so that the program can be replaced at low cost.

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The reader's attention is directed to all papers and documents which are filed concurrently with or previous to this specification in connection with this application and which are open to public inspection with this specification, and the contents of all such papers and documents are incorporated herein by reference.

10

All of the features disclosed in this specification (including any accompanying claims, abstract and drawings), and/or all of the steps of any method or process so disclosed, may be combined in any combination, except combinations where at least some of such features and/or steps are mutually exclusive.

15

Each feature disclosed in this specification (including any accompanying claims, abstract and drawings), may be replaced by alternative features serving the same, equivalent or similar purpose, unless expressly stated otherwise. Thus, unless expressly stated otherwise, each feature disclosed is one example only of a generic series of equivalent or similar features.

20

25

The invention is not restricted to the details of the foregoing embodiment(s). The invention extends to any novel one, or any novel combination, of the features disclosed in this specification (including any accompanying claims, abstract and drawings), or to any novel one, or any novel combination, of the steps of any method or process so disclosed.

30

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CLAIMS

1. A method of replacing a program in a portable  
information terminal equipment including a communication  
5 unit for transmitting and receiving data to and from an  
external device, a memory unit for temporarily storing a  
new program and a utility program operating to carry out  
the replacement of the new program, which are received  
from said communication unit, and a program storage unit  
10 for replacing a prestored program with the new program and  
storing the replaced new program, said method comprising  
the steps of:

(a) receiving the new and utility programs via said  
15 communication unit, and storing the new and utility  
programs in said memory unit; and

(b) replacing the prestored program in said program  
storage unit with the new program, using the utility  
20 program.

2. The method of replacing a program in portable  
information terminal equipment as claimed in claim 1,  
wherein said step (a) comprising the substeps of:

25 (a1) storing in said memory unit the new and utility  
programs received via said communication unit from said  
external device; and

30 (a2) checking the size and checksum of the new and  
utility programs stored in said memory unit to determine  
whether the new and utility programs were normally  
transmitted.

3. The method of replacing a program in portable information terminal equipment as claimed in claim 1 or 2, wherein said step (b) comprising the substeps of:

5 (b1) changing said program storage unit into a deletion and writing state when the new program was normally stored in said memory unit;

10 (b2) deleting the prestored program in said program storage unit;

(b3) storing the new program in said program storage unit;

15 (b4) changing said program storage unit into a reading state when the storage of the new program in said program storage unit is completed; and

20 (b5) initializing the new program stored in said program storage unit if the new program was normally stored in said program storage unit.

25 4. A method of replacing a program in a portable information terminal equipment, substantially as hereinbefore described with reference to Figures 3 to 6 of the accompanying drawings.



Application No: GB 9804622.0  
Claims searched: 1

Examiner: Leslie Middleton  
Date of search: 25 August 1998

**Patents Act 1977**  
**Search Report under Section 17**

**Databases searched:**

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK CI (Ed.P): G4A (AFL)

Int CI (Ed.6): G06F 9/445

Other: Online; INSPEC, WPI

**Documents considered to be relevant:**

Category	Identity of document and relevant passage	Relevant to claims
X Y	EP 0628908 A1 (AT & T Corp.) See columns 1-3	1 1-3 at least
Y	US 5590373 A (IBM) See whole document	1-3 at least

X Document indicating lack of novelty or inventive step  
Y Document indicating lack of inventive step if combined with one or more other documents of same category.  
& Member of the same patent family

A Document indicating technological background and/or state of the art.  
P Document published on or after the declared priority date but before the filing date of this invention.  
E Patent document published on or after, but with priority date earlier than, the filing date of this application.